

Remarks

The above Amendments and these Remarks are in reply to the Office action mailed October 29, 2003. With the withdrawal of Claims 16-26 and the cancellation of Claim 28, Claims 1-15, 27 and 29 are presented herewith for consideration.

Objection to Specification

The Examiner has indicating that the title of the invention is not descriptive. A new title has been provided and it is therefore respectfully requested that the objection to the title be withdrawn.

Objection to Drawings

The drawings are objected to under 37 C.F.R. §1.83(a) for not showing features specifically recited in Claim 28. Claim 28 has been canceled from the application and it is respectfully requested that the objection to the drawings on the stated grounds be withdrawn.

Rejection of Claim 28 Under 35 U.S.C. §112

Claim 28 is rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description and enablement requirements. Claim 28 has been canceled from the application and it is respectfully requested that the rejection on the stated grounds be withdrawn.

Rejection of Claims 1-4, 7 and 8 Under 35 U.S.C. §102(b)

Claims 1-4, 7 and 8 are rejected under 35 U.S.C. §102(b) as being clearly anticipated by Japanese Publication No. JP 04-343,318 to Nakagawa et al. ("*Nakagawa*"). Applicant has amended the claims in such

a way as to be patentable over the cited reference. >

In particular, Claim 1, and Claims 2-4, 7 and 8 dependent thereon, have been amended to recite a microstructure including in part:

a first finger including... a first surface...; and

a second finger including a first surface...,

wherein said first surface of said first finger is coplanar with said first surface of said second finger in an unbiased position.

These features are nowhere disclosed, or otherwise taught or suggested in the cited reference. The respective fingers in *Nakagawa* lie in different planes, because they are formed in different layers on the substrate during the fabrication process. As explained in the Background of the Invention section:

Some prior-art references attempt to effect Z-axis comb-finger actuation by including a plurality of stationary and movable comb-fingers, with the movable comb-fingers being located above, i.e., at a higher Z-elevation, than the stationary comb-fingers. An example of such a microactuator is disclosed in Conant et al., "A Flat High-Frequency Scanning Micromirror," 2000 Workshop for Solid State Sensors and Actuators (HH2000), Hilton Head Island, S.C., June 4-8, 2000, pp. 6-9, Digest of Technical Papers. In this type of microactuator, applying a voltage potential between the top, movable fingers and the bottom, stationary fingers pulls the movable fingers down into overlapping interdigitation with the stationary fingers.

While such microactuators offer advantages of large actuation forces and distances, they are difficult and costly to manufacture. In addition, devices such as that described in Conant et. al. are particularly difficult to manufacture, because the stationary and movable comb-fingers are formed in different planes. In Conant et al., for example, the stationary fingers are conventionally etched in the upper surface of a first wafer. Subsequently, a second wafer is affixed to the upper surface of the first wafer, and the upper surface of the second wafer is polished and etched to form the movable fingers. It is critical during the formation of the movable fingers that they be precisely aligned with the stationary fingers in the layer below, as misalignment between the stationary and movable comb-fingers can lead to instability of the microactuator. However, as movable fingers are patterned in the top layer without knowing the precise position of the stationary fingers in the bottom layer buried below, it is difficult to achieve precise alignment of the respective stationary and movable fingers.

This problem in the prior art is overcome in the present invention. Based on the amendment to Claim 1, and Claims 2-4, 7 and 8 dependent thereon, it is respectfully requested that the rejection of these claims on the stated grounds be withdrawn.

Rejection of Claims 1-4, 7-10 and 27 Under 35 U.S.C. §102(b)

Claims 1-4, 7-10 and 27 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,959,760 to Yamada et al. ("*Yamada*"). As explained hereinafter, applicant has amended the claims in a way that is believed to overcome the rejection on these grounds.

A. Claims 1-4 and 7-9

Applicant has amended Claims 1-4 and 7-9 in such a way as to be patentable over *Yamada*.

In particular, Claim 1, and Claims 2-4 and 7-9 dependent thereon, have been amended to recite a microstructure including in part:

a first finger including... a first surface...; and

a second finger including a first surface...,

wherein said first surface of said first finger is coplanar with said first surface of said second finger in an unbiased position.

These features are nowhere disclosed, or otherwise taught or suggested in *Yamada*. As in *Nakagawa*, the respective fingers in *Yamada* lie in different planes, because they are formed in different layers on the substrate during the fabrication process. Thus, based on the amendment to Claim 1, and Claims 2-4 and 7-9 dependent thereon, it is respectfully requested that the rejection of these claims on the stated grounds be withdrawn.

B. Claims 10 and 27

Applicant has amended Claims 10 and 27 in such a way as to be patentable over *Yamada*.

In particular, Claims 10 and 27 have been amended to recite a microstructure that is formed by the steps of:

- (a) forming the stationary comb-finger by etching down through a top layer on the substrate, the top layer being the uppermost layer on the substrate; and
- (b) forming the movable comb-finger adjacent to the stationary comb-finger formed in said step (a), the movable comb-finger formed by etching down through the top layer on the substrate, the top layer still being the uppermost layer on the substrate.

These features are nowhere disclosed, or otherwise taught or suggested in *Yamada*. The respective fingers in *Yamada* lie in different planes, because they are formed in different layers on the substrate during the fabrication process. Thus, based on the amendment to Claims 10 and 27, it is respectfully requested that the rejection of these claims on the stated grounds be withdrawn.

Rejection of Claims 5 and 6 Under 35 U.S.C. §103(a)

Claims 5 and 6 are rejected under 35 U.S.C. §103(a) as being unpatentable over *Nakagawa* or *Yamada*. Claims 5 and 6 depend indirectly on Claim 1. As indicated above, Claim 1 has been amended in such a way as to be patentable over both *Nakagawa* and *Yamada*. In particular, Claim 1 has been amended to recite that the first surfaces of the first and second fingers are coplanar in an unbiased position. This feature is not disclosed, or otherwise taught or suggested in *Nakagawa* or *Yamada*. The respective fingers in the cited references lie in different planes, because they are formed in different layers on the substrate during the fabrication process. It is therefore respectfully requested that the rejection of these claims on the stated grounds be withdrawn.

Rejection of Claims 11 and 12 Under 35 U.S.C. §103(a)

Claims 11 and 12 are rejected under 35 U.S.C. §103(a) as being unpatentable over *Yamada*, in further view of *Nakagawa*. Claims 11 and 12 depend directly or indirectly on Claim 10. Claim 10 has been amended in such a way as to be patentable over both *Nakagawa* and *Yamada*, taken alone or in combination with each other. In particular, Claim 10 has been amended to recite that the stationary and movable fingers are formed down through the same upper layer. This feature is not disclosed, or otherwise taught or suggested in *Nakagawa* or *Yamada*, taken alone or in combination with each other. The respective fingers in the cited references are formed in different layers on the substrate during the fabrication process. It is therefore respectfully requested that the rejection of these claims on the stated grounds be withdrawn.

Rejection of Claim 13 Under 35 U.S.C. §103(a)

Claim 13 is rejected under 35 U.S.C. §103(a) as being unpatentable over *Yamada* and *Nakagawa*. Claim 13 depends indirectly on Claim 10. As indicated above, Claim 10 has been amended in such a way as to be patentable over both *Nakagawa* and *Yamada*. In particular, the respective fingers in the cited references are formed in different layers on the substrate during the fabrication process. It is therefore respectfully requested that the rejection of Claim 13 on the stated grounds be withdrawn.

Rejection of Claim 14 Under 35 U.S.C. §103(a)

Claim 14 is rejected under 35 U.S.C. §103(a) as being unpatentable over *Yamada*, in further view of U.S. Patent No. 6,000,280 to Miller et al. ("*Miller*"). Claim 14 depends indirectly on Claim 10. As indicated above, Claim 10 has been amended in such a way as to be patentable over *Yamada*, as *Yamada* fails to teach or suggest respective fingers that are formed through the same upper layer on the substrate during the

fabrication process. *Miller* adds nothing to the teaching of *Yamada* in this regard. Therefore, the cited references, taken singly or in combination, fail to teach or suggest the invention recited in Claim 14, and it is respectfully requested that the rejection of Claim 14 on the stated grounds be withdrawn.

Rejection of Claim 15 Under 35 U.S.C. §103(a)

Claim 15 is rejected under 35 U.S.C. §103(a) as being unpatentable over *Yamada*, in further view of *Miller*. Claim 15 depends indirectly on Claim 10. As indicated above, Claim 10 has been amended in such a way as to be patentable over *Yamada* and *Miller*. In particular, the cited references, taken singly or in combination, fail to teach or suggest respective fingers that are formed through the same upper layer on the substrate during the fabrication process. It is respectfully requested that the rejection of Claim 15 on the stated grounds be withdrawn.

Rejection of Claim 28 Under 35 U.S.C. §103(a)

Claim 28 is rejected under 35 U.S.C. §103(a) as being unpatentable over *Yamada*, in further view of U.S. Patent No. 5,862,003 to Saif et al. Claim 28 has been canceled from the application, and it is therefore respectfully requested that the rejection of this claim be withdrawn.

Rejection of Claim 29 Under 35 U.S.C. §103(a)

Claim 29 is rejected under 35 U.S.C. §103(a) as being unpatentable over *Yamada*. Claim 29 depends on Claim 27. As indicated above, Claim 27 has been amended in such a way as to be patentable over *Yamada*. In particular, Claim 27 has been amended to recite that the stationary and movable fingers are formed down through the same upper layer. This feature is not disclosed, or otherwise taught or suggested in

Yamada. The respective fingers in the cited reference is formed in different layers on the substrate during the fabrication process. It is therefore respectfully requested that the rejection of Claim 29 on the stated grounds be withdrawn.

Based on the above amendments and these remarks, reconsideration of Claims 1-15, 27 and 29 is respectfully requested.

The Examiner's prompt attention to this matter is greatly appreciated. Should further questions remain, the Examiner is invited to contact the undersigned attorney by telephone.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 501826 for any matter in connection with this response, including any fee for extension of time, which may be required.

Respectfully submitted,

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